

WE CLAIM:

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A process for producing a filler-reinforced thermoplastic polymer composition which comprises:

(a) melt-forming a mixture of a high melting temperature thermoplastic polymer with a first melting temperature with a metal salt, wherein the salt is present in an amount which reduces the melting temperature of the mixture to a second lower melting temperature; and

(b) introducing a filler, which degrades at the first melting temperature, into the mixture at the second melting temperature or less without degrading the filler to form the filler-reinforced thermoplastic polymer composition.

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The process of Claim 1 wherein the filler is a cellulose.

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The process of Claim 1 wherein the filler is a cellulosic fiber.

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The process of Claim 1, 2, or 3 wherein the thermoplastic polymer is selected from the group consisting of nylon, polyethylene terephthalate (PET), polybutylene terephthalate (PBT), polytrimethylterephthalate (PTT), ethylene carbon monoxide (ECM), propylene oxide (PPO), polystyrene copolymer blends, polyacetals, cellulose butyrate, acrylonitrile-butadiene-styrene (ABS), methyl methacrylates, polychlorotrifluoroethylene polymers, and mixtures thereof.

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The process of Claim 1, 2, or 3 wherein the metal in the metal salt forms a reaction product with the polymer in the melt.

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The process of Claim 1, 2, or 3 wherein the metal salt is a metal halide.

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The process of Claim 1 wherein the thermoplastic polymer composition is molded into a shape.

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The process of Claim 1 wherein the thermoplastic polymer composition is formed by extrusion first in step (a) and then in step (b).

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The process of Claim 1 wherein the filler further includes a glass or high melting temperature polymer fiber.

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A process for producing a fiber-reinforced thermoplastic polymer composition which comprises:

5 (a) melt-forming a mixture of a high melting temperature thermoplastic polymer with a first melting temperature with at least one metal salt selected from the group consisting of lithium chloride, lithium bromide, lithium iodide, copper chloride, zinc chloride, aluminum chloride, gallium chloride, and mixtures thereof wherein the salt reduces the melting point of
10 the mixture to a second lower melting temperature; and

15 (b) introducing one or more fibers, which degrade at the first melting point, into the mixture at the second melting point or less without degrading the fibers to form the fiber-reinforced thermoplastic polymer composition.

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The process of Claim 10 wherein the fibers are selected from the group consisting of hemp, flax, kenaf, jute, sisal, pineapple leaf fiber, coir, henequen, pure cellulose in its various forms, corn, cotton, and mixtures thereof.

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The process of Claim 10 wherein the fiber-reinforced composition further includes a maleated compatibilizer and one or more toughening agents selected from the group consisting of rubber, modified rubber, maleated rubber, epoxidized rubber, vegetable oil-based plasticizer, and mixtures thereof.

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The process of Claim 10, 11, or 12 wherein the thermoplastic polymer is selected from the group consisting of nylon, polyethylene terephthalate (PET), polybutylene terephthalate (PBT), polytrimethylterephthalate (PTT), ethylene carbon monoxide (ECM), propylene oxide (PPO), polystyrene copolymer blends, polyacetals, cellulose butyrate, acrylonitrile-butadiene-styrene (ABS), methyl methacrylates, polychlorotrifluoroethylene polymers, and mixtures thereof.

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The process of Claim 10, 11, or 12 wherein the metal in the metal salt forms a reaction product with the thermoplastic polymer in the melt.

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The process of Claim 10 wherein the fiber-reinforced thermoplastic polymer composition is molded into a shape.

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The process of Claim 10 wherein the fiber-reinforced thermoplastic polymer composition is formed by extrusion first in step (a) and then in step (b).

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The process of Claim 10 wherein a glass or high melting temperature polymer fiber is introduced with the fibers in step (b).

A process for producing a filler-reinforced thermoplastic polymer composition which comprises:

(a) melt-forming a mixture of a thermoplastic polymer with a melting temperature at about 200° C or above with at least one metal salt, wherein the salt is present in an amount which reduces the melting temperature of the mixture to less than about 200° C; and

5 (b) introducing the filler, which degrades at 200° C or above, into the mixture at less than 200° C without degrading the filler to form the filler-reinforced thermoplastic polymer composition.

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The process of Claim 18 wherein the thermoplastic polymer is selected from the group consisting of nylon, polyethylene terephthalate (PET), polybutylene terephthalate (PBT), polytrimethylterephthalate (PTT), ethylene carbon monoxide (ECM), propylene oxide (PPO), polystyrene copolymer blends, polyacetals, cellulose butyrate, acrylonitrile-butadiene-styrene (ABS), methyl methacrylates, polychlorotrifluoroethylene polymers, and mixtures thereof.

The process of Claim 18 wherein the filler is selected from the group consisting of hemp, flax, kenaf, jute, sisal, pineapple leaf fiber, coir, henequen, pure cellulose in its various forms, corn, cotton, and mixtures thereof.

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The process of Claim 18 wherein the metal salt is selected from the group consisting of lithium chloride, lithium bromide, lithium iodide, copper chloride, zinc chloride, aluminum chloride, gallium chloride, and mixtures thereof.

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The process of Claim 18 wherein the filler further includes a glass or high melting temperature polymer fiber.

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A polymer composition which comprises:

(a) a modified thermoplastic polymer which has been melt-processed with a metal salt to produce a reduced melting temperature which is less than the melting temperature of a pristine thermoplastic polymer precursor; and

10 (b) a filler which has been melt-processed at the reduced melting temperature into the modified thermoplastic polymer without degrading, wherein the filler degrades at the melting temperature of the pristine thermoplastic polymer precursor.

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The composition of Claim 23 wherein the metal salt is selected from the group consisting of lithium chloride, lithium bromide, lithium iodide, copper chloride, zinc chloride, aluminum chloride, gallium chloride, and mixtures thereof.

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The composition of Claim 23 wherein the filler is a cellulosic material.

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The composition of Claim 25 wherein the cellulosic material is selected from the group consisting of hemp, flax, kenaf, jute, sisal, pineapple leaf fiber, coir, henequen, pure cellulose in its various forms, corn, cotton, and mixtures thereof.

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The composition of Claim 23 wherein the thermoplastic polymer is selected from the group consisting of nylon, polyethylene terephthalate (PET), polybutylene terephthalate (PBT), polytrimethylterephthalate (PTT), ethylene carbon monoxide (ECM), propylene oxide (PPO), polystyrene copolymer blends, polyacetals, cellulose butyrate, acrylonitrile-butadiene-styrene (ABS), methyl methacrylates, polychlorotrifluoroethylene polymers, and mixtures thereof.

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The composition of Claim 23 wherein the composition further includes a maleated compatibilizer and one or more toughening agents selected from the group consisting of rubber, modified rubber, maleated rubber, epoxidized rubber, vegetable oil-based plasticizer, and mixtures thereof.

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The composition of Claim 23 which further includes a glass or high melting temperature polymer fiber.